

WHAT IS CLAIMED IS:

1. A method for determining an optimal channelization code for assignment to a channel in a Universal Mobile Telecommunication System (UMTS), said method comprising the
5 steps of:

extending the plurality of channelization codes in the form of a tree structure having a plurality of sub-trees;

determining if a flag of at least one of a plurality of channelization code numbers

10 corresponding to respective channelization codes of a plurality of channelization codes should be set or released;

receiving a spreading factor, if it is determined that the flag of the at least one of the plurality of channelization code numbers should be set;

using the spreading factor and the tree structure to determine the optimal channelization code;

15 generating and assigning a channelization code number for the optimal channelization code; and

setting the flag of at least the generated channelization code number, thereby setting the flag for the at least one of the plurality of channelization code numbers which includes setting the flag of a channelization code number corresponding to the optimal channelization code.

20 2. The method according to Claim 1, further comprising the steps of:

receiving the spreading factor and at least one channelization code number, if it is determined that the flag of the at least one of the plurality of channelization code numbers should be released; and

25 releasing the flag of the at least one of the plurality of channelization code numbers.

3. The method according to Claim 2, further comprising the step of maintaining at least one flag corresponding to one or more channelization code numbers of the plurality of channelization code numbers set.

4. The method according to Claim 3, wherein the one or more channelization code numbers are assigned to one or more channelization codes located above at least one channelization code corresponding to the at least one of the plurality of channelization code numbers in the tree structure.

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5. The method according to Claim 1, wherein the step of setting the flag of the generated channelization code number comprises the step of setting the flags corresponding to channelization code numbers assigned to a particular sub-tree of the tree structure.

6. The method according to Claim 5, wherein a root branch of the particular sub-tree is assigned the generated channelization code number.

7. The method according to Claim 5, wherein the step of setting the flag of the generated channelization code number comprises the step of setting at least one flag corresponding to at least one channelization code number assigned to at least one branch above the particular sub-tree in the tree structure.

8. The method according to Claim 1, wherein the step of using the spreading factor and the tree structure to determine the optimal channelization code comprises the steps of:

checking a flag corresponding to an optimum channelization code number of the plurality of channelization code numbers;

determining whether a channelization code of the plurality of channelization codes which corresponds to the checked flag is available; and

identifying the channelization code as the optimal channelization code and proceeding to the step of generating and assigning the channelization code number for the optimal channelization code, if it is determined that the channelization code which corresponds to the checked flag is available.

9. The method according to Claim 8, further comprising the step of generating a message indicating that there is no available channelization code of the plurality of channelization codes, if it is determined that the channelization code which corresponds to the checked flag is unavailable.

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10. The method according to Claim 1, wherein the step of using the spreading factor and the tree structure to determine the optimal channelization code comprises the steps of:

determining a sub-tree having the maximum value according to a sub-tree value system;

10 starting from the sub-tree having the maximum value, checking whether a channelization

code of the plurality of channelization codes and corresponding to the spreading factor can be assigned to the sub-tree; and

15 identifying the checked channelization code as the optimal channelization code if the checked channelization code can be assigned.

11. The method according to Claim 10, further comprising the steps of:

determining if there is at least one additional channelization code of the plurality of channelization codes to be assigned to at least one additional sub-tree; and

20 checking at least one additional subsequent sub-tree having the next maximum value according to the sub-tree value system, if it is determined that there is at least one additional channelization code to be assigned.

12. The method according to Claim 1, wherein the step of using the spreading factor and the tree structure to determine the optimal channelization code comprises the steps of:

25 determining if there is at least one pair of channelization codes of the plurality of channelization codes in a particular sub-tree of the tree structure which can be assigned in pair; and

assigning channelization code numbers to any determined pair of channelization codes.

13. The method according to Claim 12, further comprising the steps of:

10 checking the flag corresponding to the minimum channelization code number of the plurality of channelization code numbers and to the spreading factor, if it is determined that there are no pairs of channelization codes which can be assigned in pair;

5 determining whether the flag corresponding to the minimum channelization code number has a value equal to a predetermined value;

assigning a channelization code number if the flag corresponding to the minimum channelization code number has a value equal to the predetermined value; and

10 repeating the above three steps, after shifting to another sub-tree of the tree structure, if none of the flags corresponding to the spreading factor for the particular sub-tree have a value equal to the predetermined value.

15 14. The method according to Claim 13, wherein the predetermined value is equal to zero.

15 15. The method according to Claim 1, wherein the optimal channelization code is a channelization code which is available for assignment to the channel in the UMTS while maintaining assigned channelization codes.

20 16. A system for determining an optimal channelization code for assignment to a channel in a Universal Mobile Telecommunication System (UMTS), said system comprising at least one processor capable of executing programmable instructions for performing the steps of:

extending the plurality of channelization codes in the form of a tree structure having a plurality of sub-trees;

25 determining if a flag of at least one of a plurality of channelization code numbers corresponding to respective channelization codes of a plurality of channelization codes should be set or released;

receiving a spreading factor, if it is determined that the flag of the at least one of the plurality of channelization code numbers should be set;

using the spreading factor and the tree structure to determine the optimal channelization code;

generating and assigning a channelization code number for the optimal channelization code; and

5 setting the flag of at least the generated channelization code number, thereby setting the flag for the at least one of the plurality of channelization code numbers which includes setting the flag of a channelization code number corresponding to the optimal channelization code.

10 17. The system according to Claim 16, wherein the at least one processor executes additional programmable instructions for performing the steps of:

15 receiving the spreading factor and at least one channelization code number, if it is determined that the flag of the at least one of the plurality of channelization code numbers should be released; and

releasing the flag of the at least one of the plurality of channelization code numbers.

15 18. The system according to Claim 16, wherein the step of using the spreading factor and the tree structure to determine the optimal channelization code includes performing the steps of:

20 checking a flag corresponding to an optimum channelization code number of the plurality of channelization code numbers;

determining whether a channelization code of the plurality of channelization codes which corresponds to the checked flag is available; and

25 identifying the channelization code as the optimal channelization code and proceeding to the step of generating and assigning the channelization code number for the optimal channelization code, if it is determined that the channelization code which corresponds to the checked flag is available.

19. The system according to Claim 18, further performing the step of generating a message indicating that there is no available channelization code of the plurality of

channelization codes, if it is determined that the channelization code which corresponds to the checked flag is unavailable.

20. The system according to Claim 16, wherein the step of using the spreading factor
5 and the tree structure to determine the optimal channelization code includes performing the steps
of:

determining a sub-tree having the maximum value according to a sub-tree value system;
starting from the sub-tree having the maximum value, checking whether a channelization
code of the plurality of channelization codes and corresponding to the spreading factor can be
10 assigned to the sub-tree; and
identifying the checked channelization code as the optimal channelization code if the
checked channelization code can be assigned.

21. The system according to Claim 20, further performing the steps of:

15 determining if there is at least one additional channelization code of the plurality of
channelization codes to be assigned to at least one additional sub-tree; and
checking at least one additional subsequent sub-tree having the next maximum value
according to the sub-tree value system, if it is determined that there is at least one additional
channelization code to be assigned.

20 22. The system according to Claim 16, wherein the step of using the spreading factor
and the tree structure to determine the optimal channelization code includes performing the steps
of:

25 determining if there is at least one pair of channelization codes of the plurality of
channelization codes in a particular sub-tree of the tree structure which can be assigned in pair;
and
assigning channelization code numbers to any determined pair of channelization codes.

23. The system according to Claim 22, further performing the steps of:
5 checking the flag corresponding to the minimum channelization code number of the plurality of channelization code numbers and to the spreading factor, if it is determined that there are no pairs of channelization codes which can be assigned in pair;
5 determining whether the flag corresponding to the minimum channelization code number has a value equal to a predetermined value;
 assigning a channelization code number if the flag corresponding to the minimum channelization code number has a value equal to the predetermined value; and
 repeating the above three steps, after shifting to another sub-tree of the tree structure, if 10 none of the flags corresponding to the spreading factor for the particular sub-tree have a value equal to the predetermined value.

15 24. The system according to Claim 23, wherein the predetermined value is equal to zero.

25. The system according to Claim 16, wherein the optimal channelization code is a channelization code which is available for assignment to the channel in the UMTS while maintaining assigned channelization codes.